Memorandum

TO: Ravalli County Planning Department

FROM: Kylie Paul, Land Use Clinic, University of Montana School of Law

DATE: May 20, 2007

RE: Highway 93 S Corridor: Supporting Document for Sample Wildlife Crossing Overlay District

OVERVIEW

Human development can have many negative effects on wildlife, both at an individual and population level. Ravalli County and its citizens value wildlife (Ravalli County Growth Policy Countywide Policy 5.1), and providing protection of land approaching wildlife crossing structures and maintaining wildlife corridors would help to reduce negative effects of development on wildlife. Principles supported by the Proposed Wildlife Crossing Overlay District are listed below. Understanding the biological background behind these principles is important, and a brief overview has been provided. This is not intended to act as a summary and/or synthesis of the relevant science; it is simply an overview. A short list of suggested further readings is also provided.

PRINCIPLES

Principle 1: Maintain wildlife movement through the region's corridors

Scientific Rationale for Principle 1

- Most species make daily, seasonal (migrations), or once-in-a-lifetime travel movements from one habitat or type of habitat to another, for breeding, feeding, and refuge.
- Connection between these habitats is critical. The viability of local populations may rely on these movements.
- Development may fragment habitat and cut off these movements, making large areas of habitat inaccessible.
- This fragmentation may isolate nearby populations of a species, which makes them vulnerable to localized and eventually regional extirpation, as their population sizes may reduce, they may become more vulnerable to disease, and their genetic pool may be reduced.
- Movements may be maintained or enhanced through protection of corridors. The importance of corridors and routes for dispersion is amplified in developed or fragmented landscapes because alternative overland travel routes are often unavailable, discontinuous, or life endangering. Corridors that facilitate wildlife movement help maintain the health of species' gene pools and prevent isolation and possible extirpation of subpopulations.

Principle 2: For buffers and setbacks, follow riparian areas when available or related vegetated regions (gullies, etc) when available

Scientific Rational for Principle 2

- Most wildlife species, particularly those sensitive to human activity, move along vegetated habitats such as riparian areas more than open areas.
- Riparian corridors support a disproportionately large amount of biodiversity compared to other landscape elements.
- By virtue of their protective cover and connectivity throughout watersheds, riparian areas function as wildlife travel corridors, enabling movement of wildlife between habitat patches.

Principle 3: Facilitate wildlife movement through wildlife crossing structures

Scientific Rationale for Principle 3

- Particularly when combined with wildlife fencing that funnels wildlife into them, wildlife crossing structures reduce road-kill and allow safe movement from one side of a road to another.
- Large, medium, and small animals have been documented, by studies in many states and countries, using wildlife crossing structures. These range from grizzly bears and mountain lions to endangered turtles and frogs.

Principle 4: Facilitate wildlife movement through crossing structures by protecting the land approaching the crossing structures

Scientific Rationale for Principle 4

- Numerous biologists have noted the importance of protecting habitat on both sides of highways in the vicinity of wildlife crossing structures.
- Crossing structures will only be as effective as the land and resource management strategies around them. Site-level impacts from development and high levels of human activity near crossing structures will decrease habitat quality and likely disrupt animal movements. Similarly, alteration of landscape elements at a broader regional-scale could impede or obstruct movements towards the structures, preventing animals from using them entirely, thus rendering them ineffective.

Principle 5: Maintain no-disturbance buffers for areas approaching wildlife crossing structures

Scientific Rationale for Principle 5

- Some species may require specific natural elements for their survival, and it may be necessary to incorporate those elements into corridor design. Given the potential importance of habitat type and quality, a corridor should incorporate and maintain intact natural habitat when possible.
- Human use of wildlife crossing structures is considered to have a negative effect on the use of the structure by wildlife.
- Human activity/disturbance near the crossing structure can be a deterrent to its use by wildlife.
- Use of crossing structures has been found to increase with increased natural habitat. The presence of tree and shrub cover that can be provided by riparian areas or other vegetated areas is considered determinant for the use of crossing structures by many species. The presence of cover on the approaches to wildlife crossing structures, in the form of vegetation, rocks and logs, may enhance use by a variety of small, mid-sized, and large mammals

BUFFER DISTANCES

The distance selected in the sample overlay was derived from needs of various species pooled from wildlife corridor and riparian literature, the suggestions of several wildlife biologists, and examples of habitat protection ordinances/regulations from the region. Several of the ordinances suggested very large buffers for wildlife corridors (i.e. 1/4 mile). The goal of the selected width is to obtain a multi-species assemblage for wildlife movement. A list of examples of studies with varying suggested buffer widths is provided below. The small mammal wildlife crossings have a different buffer approach, given that these structures were intended to connect small habitats, mainly to link drainages, so the buffer boundaries surround those habitat features.

Table 1. Examples of studies suggesting widths of buffers

Perpendicular distance from stream in feet (meters)	Function	Source
328 ft to .62 mile (100-1000)	Long-term functioning of corridor and general metapopulation persistence	Hilty et al. 2006
328 (100)	Recommended buffer for large mammals	Jones et al. 1988
200 (61)	Deer and elk cover	Mudd 1975
200 (61)	Deer and elk- distance hiding cover needed at 90% vegetative cover	Mudd 1975
636 (191)	Average distance from foot traffic that elicited a locomotor avoidance response in mule deer	Freddy et al. 1986
328 (100) 1312 (400)	Minimum width for cougar movement for a corridor less than 2624 feet long Minimum width for cougar movement for a corridor over .62 mile long	Beier 1995
328 (100)	Vegetation within this distance used by red fox and marten as travel corridors and habitat	Small 1982
328 (100)	Mink dens/cover/forage	Melquist et al. 1981, Allen 1986
300 (91)	Needed on each side of stream to provide a 600 ft travel corridor in mature uncut basins for fisher or a travel corridor between clearcuts for marten	Freel 1991
220 (67)	No small mammal species lost	Cross 1985
220-305 (67-93)	Recommended buffer for small mammals	Jones et al. 1988

Buffer bibliography

Allen, A. W. 1983. Habitat suitability index models: beaver. U.S. Fish and Wildlife Service, FWS/OBS-82/10.30.Wash., D.C. 20pp.

Beier, P. 1995. Dispersal of juvenile cougars in fragmented habitat. Journal of Wildlife Management 59:228-237.

Cross, S.P. 1985. Responses of small mammals to forest riparian perturbations. In Riparian Ecosystems and their Management: Reconciling Conflicting Uses. Proceedings of First North American Riparian Conference, University of Arizona, Tucson, AZ, April 16-18, 1985. U.S. Forest Service General Technical Report RM-120.

Freddy, D. J., W. M. Bronaugh, and M. C. Fowler. 1986. Responses of mule deer to disturbance by persons afoot and snowmobiles. Wildlife Society Bulletin 14:63-68.

Freel, M. 1991. A literature review for management of the marten and fisher on national forests in California. U.S. Forest Service, Pacific Southwest Region, San Francisco, Calif. 22pp.

Hilty, J. A., W. Z. Lidicker, A.M. Merenlender. 2006. Corridor Ecology: the science and practice of linking landscapes for biodiversity conservation. Island Press, Washington D.C. 321 pps.

Jones, K. B. 1988. Comparison of herpetofaunas of natural and altered riparian ecosystems. U.S. Forest Service General Technical Report RM-166:222-227.

Melquist, W. E., J. S. Whitman, and M. G. Hornocker. 1981. Resource partitioning and coexistence of sympatric mink and river otter populations. Pages 187-220 *in* J. Chapman and D. Pursley, eds. World Furbearer Conf. Frostburg, Md.

Mudd, D. R. 1975. Touchet River Study: Part I. Wash. Dept. Game, Olympia. 43pp.

Small, M. 1982. Wildlife management in riparian habitats. Publication of the Maine Agriculture Experimental Station, Orono.

Suggested Reading

Clevenger, A.P., and N. Waltho. 2000. Factors influencing the effectiveness of wildlife underpasses in Banff National Park, Alberta, Canada. Conservation Biology 14, 47–56.

Clevenger, A.P. and N. Waltho. 2005. Performance indices to identify attributes of highway crossing structures facilitating movement of large mammals. Biological Conservation 121, 454-464.

Duerksen, C.J., D.A. Elliot, N.T. Hobbs, E. Johnson, J.R. Miller. 1997. Habitat Protection Planning: Where the Wild Things Are. American Planning Association, Planning Advisory Service Report Number 470/471. 82 pps.

Forman, R.T.T., D. Sperling, J.A. Bissonette, A.P. Clevenger, C.D. Cutshall, V.H. Dale, L. Fahrig, R. France, C.R. Goldman, K. Heanue, J.A. Jones, F.J. Swanson, T. Turrentine, and T.C. Winter. 2003. Road ecology: science and solutions. Island Press, Washington, DC. 481pps.

Granger, T., T. Hruby, A. McMillan, D. Peters, J. Rubey, D. Sheldon, S. Stanley, E. Stockdale. April 2005. Wetlands in Washington State - Volume 2: Guidance for Protecting and Managing Wetlands. Washington State Department of Ecology. Publication #05-06-008. Olympia, WA. www.ecy.wa.gov/biblio/0506008.html.

Hilty, J. A., W. Z. Lidicker, A.M. Merenlender. 2006. Corridor Ecology: the science and practice of linking landscapes for biodiversity conservation. Island Press, Washington D.C. 321 pps.

Jackson, S.D. and C.R. Griffin. 2000. A Strategy for Mitigating Highway Impacts on Wildlife. Pp. 143-159 In Messmer, T.A. and B. West, (eds) Wildlife and Highways: Seeking Solutions to an Ecological and Socio-economic Dilemma. The Wildlife Society.

Knutson, K. L., and V. L. Naef. 1997. Management recommendations for Washington's priority habitats: riparian. Washington Department of Fish and Wildlife, Olympia. 181pp.

Ruediger, B. …[et.al]. 2004. An Assessment of Wildlife and Fisheries Habitat Linkages on Highway 93—Western Montana. USDA Forest Service, USDI Fish and Wildlife Service, Confederated Salish and Kootenai Tribe, Rocky Mountain Elk Foundation, Montana Fish, Wildlife and Parks, Montana Department of Transportation, Geodata Services, The University of Montana. Forest Service Publication #R1-04-81, Missoula MT. 41 pp.

Sheldon, D., T. Hruby, P. Johnson, K. Harper, A. McMillan, T. Granger, S. Stanley, and E. Stockdale. March 2005. Wetlands in Washington State - Volume 1: A Synthesis of the Science. Washington State Department of Ecology. Publication #05-06-006. Olympia, WA. http://www.ecy.wa.gov/biblio/0506006.html.

White, T. and M. Ernst. 2003. Second Nature: Improving Transportation Without Putting Nature Second. Defenders of Wildlife.